STATEMENT OF
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Good morning, Mr. Chairman and Members of the Subcommittee. Thank you for the opportunity to speak to you on behalf of the U.S. Geological Survey (USGS) regarding our FY 2006 proposed budget, our scientific contributions that reduce America's risk to natural hazards, and our stewardship of our Nation's natural resources.

The President's FY 2006 budget request for USGS is $933.5 million in current appropriations, a decrease of $1.9 million from the FY 2005 enacted level. This budget will continue the Survey's scientific excellence in the core USGS science programs and emphasize our response to natural hazards.

The past 12 months have provided a wake-up call to our Nation's citizens regarding the world we inhabit. Nature gave us several tragic reminders of her force. More than 27 major disasters were declared in the United States from earthquakes, landslides, hurricanes, fires, and floods. In late summer and early fall, four hurricanes swept through the Gulf of Mexico and the East Coast, wreaking havoc in every community they touched. In late September, after nearly 20 years of silence, Mount St. Helens awakened, and is still erupting. Three other volcanoes in the United States and its territories – Mount Veniaminof, in Alaska, Anatahan in the Northern Mariana Islands, and Kilauea in Hawaii are erupting, and Mauna Loa in Hawaii and Mount Spurr in Alaska are showing increased activity and could erupt with little or no warning. The year ended with the magnitude 9.0 earthquake off the coast of Sumatra that triggered a devastating tsunami in the Indian Ocean. During January, moderate to heavy rains fell on already saturated soils in California and in the Ohio Valley. This created devastating landslides in several California coastal communities, and record level flooding in Indiana. Wildland fires burned more than 8 million acres in 40 states. Alaska accounted for nearly 82% of those acres burned in 2004.

Natural hazards will always be with us and are difficult to predict. With USGS science, however, we are striving to prevent these natural hazards from becoming disasters. This is not just a scientific endeavor – it is a matter of public safety – it is a matter of protection from risk.

Each year, natural hazards in the United States such as earthquakes, fires, floods, hurricanes, landslides, and volcanoes result in hundreds of lives lost and cost billions of dollars in disaster aid, disrupted commerce and destroyed public and private properties. At USGS, it is our goal to provide scientific research and analysis to help citizens, emergency managers, and policy makers decide on how to react to each hazard and how to safeguard society. By collecting long-term data and information assessing past and present hazard events; by providing continuous monitoring and data collection; we hope to get to the place where we are able to predict these natural events, and to mitigate their potential impacts, providing time to save lives and property.

USGS has the lead Federal responsibility under the Disaster Relief Act (P.L. 93-288, popularly known as the Stafford Act) to provide notification for earthquakes, volcanoes, and landslides, to enhance public safety, and to reduce losses through effective forecasts and warnings based on the best possible scientific information. We produce coastal change vulnerability products to provide pre-hurricane forecasts of impacts to infrastructure, essential for evacuation and post-storm recovery efforts. In the case of wildfires, USGS with Federal partners monitor seasonal fire danger conditions and provide firefighters with maps of current fire locations, perimeters, and potential spread.

We have a challenge – we are at new stages in our ability to assess, monitor, and predict these earth hazards. Our goal is to work towards the same level of capability in these areas.

For earthquakes, it is not yet possible to predict the time and location of damaging events, but it is possible to predict their impacts and deliver rapid post-event information to emergency responders. First, USGS delivers long-term forecasts of earthquake shaking in the form of hazard maps that underlie most building codes used in the United States. Second, within minutes after a domestic earthquake, USGS and its regional network partners issue an alert with location and magnitude. In five urban areas where dense arrays of strong-motion instruments have been deployed through the Advanced National Seismic System (ANSS), Internet-distributed ShakeMaps showing the intensity of ground shaking are available to prioritize response efforts. Following the December 2003, magnitude 6.5 San Simeon earthquake, the California Office of Emergency Services (OES) was automatically notified within five minutes, and the first ShakeMap was pushed to OES and other users in less than nine minutes. Third, in the time scale of hours to days following large earthquakes, USGS provides short-term predictions for the likelihood of aftershocks, a capability that currently exists only in California but could be expanded nationwide.

In addition to ANSS, the USGS operates the Global Seismographic Network (GSN) to monitor earthquakes in the United States and abroad. The ANSS includes a nation-wide Backbone Network plus 17 regional seismic networks in high-hazard areas, operated through partnerships with universities and state governments. The GSN is a constellation of 130 globally distributed, modern seismic sensors, operated in partnership with the National Science Foundation and universities. Seismic data flow in real-time to the USGS National Earthquake Information Center (NEIC) in Golden, Colorado where they are analyzed. In turn, the USGS automatically transmits earthquake data, including locations, magnitudes, and, where requested, the actual seismograms, to federal response agencies including FEMA and NOAA, State government emergency managers, private sector entities, and the public and media. For tsunami warning purposes, ANSS and GSN seismic data are relayed in near-real-time to the NOAA tsunami warning centers, enabling them to respond within minutes after a major earthquake. USGS and NOAA also exchange earthquake locations and magnitude estimates, with USGS providing the final authoritative magnitudes of events.

At the present time, about 80% of GSN stations transmit real-time data that can be used for rapid earthquake analysis and tsunami warning. The Administration has requested funding to extend the GSN's real-time data communications, as well as to improve station uptime through more frequent maintenance. These changes will likewise improve tsunami warning in the U.S. and globally. The President's proposed increase in funding to USGS in response to the tsunami disaster will allow us to make a number of the critically needed improvements to performance, providing the NEIC with 24 x 7 operations capacity and completing software and hardware upgrades to speed earthquake data processing and notification. NEIC will decrease average reporting time for global earthquakes (currently over one hour in some cases) and reliably

deliver a complete suite of earthquake products—including estimates of human impact—to 20 minutes or less. These changes clearly have a dual benefit, improving our capability to respond to earthquakes as well as support the tsunami warning responsibility of NOAA.

For earthquake-generated tsunamis, the USGS provides real-time seismic data from these global and regional seismic networks to the National Oceanic and Atmospheric Administration (NOAA), which has the responsibility to issue warnings through its National Weather Service (NWS). To address the tsunami risk to the U.S., the USGS and NOAA are collaborating on the development of the global tsunami warning system, with USGS contributing more real-time earthquake monitoring, and with NOAA expanding its network of sea-level monitoring buoys and real-time tide gauges and taking the lead on coastal mapping and public education.

With appropriate monitoring, impending volcanic eruptions generally can be forecast and warnings issued in time for communities to prepare. Forecasts and warnings depend on robust telemetered, real-time data streams from monitoring instruments on volcanoes, including reliable data transmitted by other agencies (e.g., GOES satellite data from NOAA, seismic data from key university cooperators). The United States and its Territories encompass 169 volcanoes considered to be active, more than any other country in the world. In fact, May 18 marks the 25th anniversary of the explosive eruption of Mount St. Helens. The USGS and its partners presently monitor 50 volcanoes at five USGS volcano observatories using ground-based sensors. A USGS National Volcano Early Warning System plan, which prioritizes monitoring and assessment at U.S. volcanoes using new ground and satellite-technology, is under development. Observatory-based scientists are still necessary to interpret monitoring data as eruptions are too complex for the fully automatic generation of alerts directly from machine signals. Automatic warnings of large volcanic debris flows (lahars) based on signals from acoustic-flow-monitor arrays may be the exception. USGS volcano observatories also issue notifications of ash producing volcanic eruptions to the Global Network of Volcanic Ash Advisory Centers to ensure the safety of aircraft from ash clouds. By placing new sensitive monitoring instruments at hazardous volcanoes in advance of the unrest, we will ensure that communities at risk can be forewarned with sufficient time to prepare and implement response plans and mitigation measures. The USGS has closely monitored the eruption of Mount St. Helens since September 2004, correctly forecasting the style of eruption; we remain in daily communication with the Washington State Emergency Management Division and the U.S. Forest Service, who rely on USGS information to restrict public access to potentially threatened areas surrounding the volcano.

Landslides and ground failures, whether induced by rainfall, volcanoes, or earthquakes, impact every state. These events involve physical processes that are not sufficiently well understood to permit reliable predictions, but the capability to provide advanced warning of increased landslide risk from rainfall now exists. Warnings require accurate rainfall thresholds to monitor the hazard and a good understanding of landslide travel distances to gage possible impact. First we study susceptible geographic regions having the requisite geology and topography. Probable landslide paths and travel distances are analyzed to identify possible landslide hazards, for example, by specifying areas where landslides have a high probability of impacting roads and buildings. Advanced weather forecasts are combined with threshold models to evaluate whether landslides are likely to occur within regions susceptible to landsliding. Real-time monitoring of rainfall and site measurements of rising groundwater and initial slope movements near landslide sources all provide critical information for issuing immediate public warning of landslide hazards. USGS scientists have issued advisories of potential landslides to the National Weather Service, California Office of Emergency Services (OES), other State and Federal agencies, and the public – three times in the past month and as recently as February 15. The San Bernardino

County Sun and other local newspapers have used these advisories in crafting news articles alerting their readers to the possibility of landslide occurrence and instructing their readers on ways to protect themselves.

Hurricanes and coastal storms can devastate great swaths of the coast and inland structures. They not only destroy structures but cause extreme coastal erosion, overwash, land loss, flooding, and sometimes landslides as they move inland. The NWS will attest to the difficulty of predicting landfall and storm track. The USGS currently utilizes NWS products forecasting storm landfall in combination with USGS databases on coastal condition (beach and dune height and position) and models of processes to provide assessments of coastal change vulnerability prior to landfall. For example, prior to landfall of Hurricane Ivan on the Gulf coast in September 2004, USGS combined detailed coastal elevation data with NOAA storm forecasts and, utilizing models of coastal response to surge and waves, produced maps of coastal vulnerability to inundation. The pre-storm coastal elevation data, combined with post-storm surveys, allowed USGS and Federal partners to provide rapid regional assessments of storm impacts. Our overall objective is to improve the capability to predict coastal change that results from severe tropical and extra-tropical storms. Such a capability will facilitate locating buildings and infrastructure away from coastal change hazards. New technology in the form of airborne laser surveys and imagery enable us to more accurately portray coastal change.

Flood watches and warnings, issued by the National Weather Service, require USGS real-time streamflow information. During the flood of January 2005 in the Wabash River Basin, early field confirmation by USGS streamgages of serious local flooding gave the National Weather Service the confidence to state that the flood event would be unlike any flooding that had previously occurred in southern Indiana and eastern Illinois. These watches and warnings are disseminated rapidly and broadly through both the public and private communications channels. Federal, State, and local agencies also use real-time USGS streamflow data to prepare their own operational forecasts for flood-control reservoirs, river levees and evacuation routes. Getting the streamgage information to these partners requires modern hydrologic instruments, coupled with national computer and communication infrastructures, NOAA/GOES satellite telemetry, and a staff of trained hydrologic technicians to calibrate and maintain these instruments. While NWS has the statutory responsibility for issuing flood watches and warnings, the USGS real-time streamflow information provides essential support for this activity. We have made several innovations recently to improve the timeliness and quality of USGS information used by public and private entities to reduce flood damages and loss of life.

Wildland fires threaten all 50 States. In 2004, more than 8 million acres were burned. The USGS supports the fire management agencies in the conterminous U.S. and Alaska by providing timely fire danger information based on the condition of vegetation and associated metrics that characterize fire danger. Nationally, the vegetation condition information is produced from satellite observations acquired by the NOAA polar orbiting environmental satellites. The USGS has assembled a 15-year time series of observations that is used to monitor temporal and spatial variations of vegetation condition and fire fuel characteristics. In addition, the USGS is teaming up with the Forest Service to characterize vegetation, fire fuels, and fire regime conditions at regional and local scales. To aid wildland fire suppression, USGS manages and hosts the Geospatial Multi-Agency Coordination Group or GeoMAC, an Internet-based tool that permits fire managers to access online maps of current fire locations and perimeters. We work with the National Interagency Fire Center to analyze satellite information to obtain updates of land cover vegetation to determine fire-weather conditions. Post-fire we work with land managers to determine erosion, landslide, and flood potential and to develop

restoration and rehabilitation plans. Such fire research and development are contributing to decision making for firefighting and protection of wildland-urban interfaces.

Prompt alerting of what is happening during and immediately following a natural disaster is critical. Regardless of the type of hazard, effective warnings require more than monitoring and notification technology. Their success depends on hazard research, up-to-date response plans in place, and pre-event linkages among Federal, State, and local government agencies, nongovernmental organizations, the private sector, and the media. Effective warnings require an integrated system involving information gathering, expert evaluation, generation of accurate warnings, and communication to an educated and informed audience that is prepared to take effective action.

Scientific and technological advances made in the USGS, universities, and the private sector in the past few decades present great opportunities for improvements in forecasts, warnings, and hazard assessments. There remains a need for modernization and expansion of real-time monitoring networks, robust satellite imagery and telemetry capabilities, hazard assessments to guide network designs, and robust and secure communications for dissemination of warnings and alerts.

2004 was a year of extreme natural hazards. To prepare for these events and to reduce the public's risk we continue to improve our hazard assessments, monitoring, warnings and predictions that will allow people to take actions that save lives, protect property, reduce business disruption, and speed recovery.

USGS CORE SCIENTIFIC RESPONSIBILITIES

The FY 2006 budget emphasizes not only the response to these natural hazards but the core USGS science programs that focus on water resources and water availability, biology, information technology, and projects that support science on the Department of the Interior (DOI) landscape. The FY 2006 USGS budget request is $933.5 million, a decrease of $1.9 million from the FY 2005 enacted level.

The President's FY 2006 budget provides $208.1 million for the Geology Program. This budget request provides opportunities to address several critical program needs related to monitoring natural hazards and mitigating their impacts. Most significantly, the Administration requests $5.4 million for the USGS to install and maintain additional seismic monitoring stations to serve the dual purposes of supporting development of a global tsunami warning system and enhancing earthquake monitoring and warnings. The FY 2006 budget also includes increases for seismic monitoring and maintains funding for the Advanced National Seismic System (ANSS), which provides accurate and timely information about earthquakes and their effects on buildings and structures using modern monitoring methods and technologies. The Administration has requested $8.1 million as part of the 2005 emergency supplemental funding request for the USGS to begin procuring and installing additional seismic monitoring stations and to enhance the existing seismic monitoring network for tsunami detection. Increased volcanic unrest in several U.S. volcanoes has prompted the Administration to request additional funding to expand monitoring at the volcanoes most threatening to American lives and property. The $864,000 increase in volcano monitoring will be used to complete modernization of the Mount St. Helens monitoring network and improve the monitoring capability at other Cascade volcanoes, as well as expand monitoring in the Northern Mariana Islands. A $500,000 increase is proposed to begin investigating the nature and extent of geothermal systems capable of producing electric power and provide assessments of geothermal resources in the western

United States. It is essential that we look at potential ways to provide for the growing energy requirements of the West.

To provide resources for other Administration, Interior, and USGS priority efforts and to support the Administration's plan to reduce the Federal deficit by half by 2009, the FY 2006 budget request includes a proposed reduction in the Geology program of $29.8 million for selected individual projects and lower priority mineral resource efforts. This reduction will terminate the collection of nation-wide basin geologic and mineral deposit data, the internationally coordinated global mineral resource assessment, many mineral commodity reports, and will eliminate approximately 240 FTE within the USGS. The $25 million remaining in the program will continue funding for minerals surveys and studies relevant to ongoing Federal energy, land management, regulatory, and remediation activities more oriented to the interests of States, local governments, and universities, all of whom are significant users of information generated by the Minerals Resources Program. The expertise exists at various universities and state geological surveys to continue minerals work brought to an end with this reduction.

The Science Impact program integrates USGS science in decision-making. The FY 2006 budget proposes an increase of $250,000 to integrate earth science and social sciences to inform the decisions relating to western water issues.

The FY 2006 budget for the Geography Program proposes $133.3 million for mapping, remote sensing, and geographic investigations. This request includes an increase of $6.0 million necessary to continue operations of Landsat 7, which provides medium-resolution imagery to the Nation. This increase will ensure the continued availability of Landsat data and provide the necessary resources for data reception, processing, and archiving. As part of the budget proposal to provide a long-term solution to the funding shortfall problem with Landsat 7, due to the failure of the scan line corrector, the USGS will propose a reprogramming in FY 2005 to cover this year’s anticipated shortfall in revenue. The USGS reprogramming request will redirect proposed working capital fund contributions in FY 2005 to the Land Remote Sensing program. $6.0 million in FY 2006 will replace the working capital fund contributions that are redirected in 2005. The budget also proposes an increase of $7.5 million to enable USGS to begin system development, in collaboration with NASA and NOAA, to ensure data distribution for the Landsat Data Continuity Mission (LDCM) to be launched in 2009.

The FY 2006 budget for the Water Program proposes $204.2 million to continue work on issues related to water availability, water quality, and flood hazards. This budget proposal represents an increase of $400,000 for a broad multi-State effort on assessment of ground-water depletion. The USGS will develop a Web-based system to display and analyze long-term changes in ground-water reserves in the western United States. This system would provide the information about the status and trends in ground-water to the public, policymakers, and water-management agencies. The budget proposes a decrease of $6.4 million that eliminates USGS funding for each of the 54 State Water Resources Research Institutes that have been generally successful in generating other sources of funding and should be able to support themselves.

The FY 2006 budget requests $172.9 million for the Biology Program to find solutions for and to assist in the mitigation of biological resource problems facing Federal agencies and State, local, and Tribal governments. This request includes an increase of $250,000 to continue ecological systems mapping by building on existing partnerships; an increase of $252,000 to focus on deepwater fisheries research in the Great Lakes; and $300,000 for research on invasive species including tamarisk in the Rio Grande Basin, Brazilian pepper tree research in South Florida, and leafy spurge in the Northern Great Plains. The FY 2006 budget also provides an increase of

$750,000 to develop and refine fisheries assessment models, provide habitat information for the endangered humpback chub, and support experiments on non-native fish removal in Grand Canyon National Park near the confluence with the Little Colorado River. This work will support the work of the Glen Canyon Adaptive Management Work Group.

The FY 2006 budget request supports the Administration's commitment to strengthen science support to the Department's land and resource management bureaus by proposing a $750,000 increase for science on Interior lands. This will provide funds for enhanced earth and biological science to meet the needs of Interior's bureaus, with cost-sharing and partnership emphasis. Some of the study areas will include coal bed methane and Mancos shale landscapes in the northern Front Range of the Rockies; geologic and hydrologic processes in the Lower Colorado River basin; habitat assessment for the entire North Slope region of Alaska; and ecosystem sustainability studies in the East.

The FY 2006 budget proposal for the Enterprise Information Program is $47.8 million. A proposed increase of $1.1 million will focus on improving IT security and is part of a DOI-wide certification and accreditation activity. This proposal also reflects an increase of $1.2 million to deploy the Enterprise Services Network to provide secure, state-of-the-art internet and intranet connections that will be used by the entire Department, and will provide a secure standardized efficient 24/7 operation.

CONCLUSION

Today, March 3rd, is the 126th birthday of the USGS. The public depends on the USGS for the scientific information they need to make decisions. We have evolved from data gathered with picks, pack mules, and wagon trains to remote sensors with real-time data access and satellite-transmitted measurements. Throughout our history, our science has made a difference in people's lives and safety and has contributed to the Nations economic and environmental health. We will build on that tradition to provide the American people and the world a wealth of data, long-term scientific understanding, and scientific tools that serve the needs of the American people, and contributions that reduce public risk and safeguard the public from natural hazards. We will continue to strive to make a difference in people's lives and safety and to reduce their risk from natural hazards.